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EARNINGS FORECAST--A MULTIVARIATE ANALYSIS

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Earnings Forecasts--A Multivariate Analysis

INTRODUCTION

In a pronouncement released in February, 1973, the Securities and Exchange Commission announced a decision to permit voluntary disclosure of earnings forecasts by listed companies [1]. These forecasts, however, will not be attested to by third parties since the Commission felt that sufficient principles of forecasting do not exist to allow verification. It appears that this change in attitude by the Commission will lead to an increasing number of earnings forecasts becoming public information.

The central question that has surrounded the discussion of earnings forecasts is the accuracy of these forecasts. Accuracy is of prime importance to investors, the primary users of the forecasted information. If the forecasts are not accurate enough on which to rely in making investment decisions, then the forecasts will not serve the needs of the intended users. The firms issuing the forecasts are also concerned with the accuracy of forecasts because of the possible effect of forecast errors on public confidence in the management of the firm. Lastly, public accountants are concerned with the accuracy of forecasts because the possibility exists that in the future they will be called upon to attest to the forecasted data.

The interest in the accuracy of forecasts points out a need for research to indicate what factors are associated with inaccurate forecasts,

or forecast errors. Knowledge of these factors should enable the investor to better assess the accuracy of forecasts since he will have an indication of which factors have the greatest association with forecast errors. The firms that issue the forecasts can make use of this knowledge in determining which factors need the most attention in preparing the forecasts. Finally, the independent public accountant can use the knowledge of factors associated with accuracy in determining what items need the most effort in the verification process.

Little actual research has been done in identifying the factors associated with forecast errors, although much speculation has been offered from various segments of the financial community. The purpose of this paper is to examine the association between some quantifiable factors and earnings forecast errors.

THE RESEARCH DESIGN

The research described centers on the contention that forecast errors are due to the occurrence of events that are unexpected by the managements of the firms making earnings forecasts. These unexpected events may be visualized as occurring at three levels: the general economy, the industry of which the firm is a member, and the individual firm itself. Therefore, the question this research is designed to examine is what is the association between forecast errors and unexpected events that affect the general economy, unexpected events that affect only the industry of which the firm is a member, and finally, unexpected events that affect only the individual firm.

The Model

A general model can be specified that incorporates the factors mentioned above. The model takes on the following general form:

$$E_F = f(G, I, F)$$

This model specifies that forecast errors, E_F , are a function of three variables, unexpected changes in general economic conditions, G , unexpected changes in industry conditions, I , and finally, unexpected changes in individual firm conditions, F .

The logic of this model implies that forecast errors may occur simply because the general economy takes an unexpected turn, up or down, between the time the forecast is made and the end of the period to which the forecasts relates. If the change in general economic conditions is anticipated at the time the forecast is prepared, it is assumed that the change would be incorporated into the forecasting process.

Alternatively, the unexpected occurrence that is associated with a forecast error may not affect the general economy, but may affect the particular industry of the firm making the forecast. An example of such an occurrence would be an unexpected change, up or down, in industry demand. Again, it is assumed that if the change was anticipated at the time the forecast was prepared it would be incorporated into the forecasting process.

Finally, the unexpected occurrence that is associated with a forecast error may affect only the individual firm making the forecast. For example, a change in demand due to a new product that does better in the market place than expected, or an employee strike that is unanticipated. These occurrences would cause an unanticipated change in the results of

normal operations. It is also possible that an unexpected event that is not part of normal operations may be associated with a forecast error, for example, a natural disaster or sale of capital assets at an unanticipated price. As in the previous cases, it is assumed that if these occurrences were anticipated at the time the forecasts were prepared their effect would be taken into consideration.

Variables to be Examined

In the generalized model presented above, elements associated with forecast errors were posited as coming from three sources: the general economy, the firm's industry, and the individual firm itself. In order to examine this association, however, it is necessary that these three elements be operationalized. Since no theory, per se, exists that explains forecast errors, the choice of variables is not rigidly controlled. The variables chosen are those frequently mentioned when earnings forecasts are discussed. It is seldom that all are mentioned in any single discussion, but usually several are mentioned as being associated with earnings forecast errors. The variables chosen for examination are as follows:

General economic variables

P_1 - Change in the rate of growth of Gross National Product.

This variable is computed as the difference between the growth rate of GNP in the year of the forecast and the average growth rate of GNP for the three years prior to the year of the forecast.

P_2 - Change in rate of profit growth for all firms. This variable is measured by the difference between the change

in corporate profits as measured by the First National City Bank of New York's index of corporate profits [2] for the year of the forecast and the average change of that index for the three years prior to the year of the forecast.

P₃ - Rate of inflation. For purposes of this study, inflation is measured as the change in the GNP Implicit Price Deflator.

P₄ - Change in income taxes measured by the change in the federal corporate income tax rate in the year of the forecast.

Industry variable

P₅ - Rate of change in industry profits. The variable is computed as the difference between the change in profits for firms in the same industry as the firm making the forecast and the average change in industry profits for the three years prior to the year of the forecast. The First National City Bank of New York index of corporate profits [2] is used as the source of profit figures.

Firm variables

P₆ - Change in firm profits measured by the difference in the change in operating earnings of the firm in the year of the forecast and the average change in operating earnings of the firm for the three years prior to the year of the forecast.

P_7 - Variability in past earnings. This variable is measured by the coefficient of variation of operating earnings for the five years prior to the year of the forecast.

P_8 - Size of the firm as measured by average total assets for the year of the forecast.

P_9 - Size of the firm as measured by total revenue in the year of the forecast.

P_{10} - Nonrecurring events affecting earnings measured by the ratio of reported extraordinary gains and losses to operating earnings for the year of the forecast.

The general economic variables chosen for the research are intended to represent aberrations in the economy that may be unexpected by the managements of firms making earnings forecasts. If these aberrations are indeed unexpected, there should be an association between these variables and the earnings forecast errors. Likewise, the industry variable chosen for the research is intended to represent unexpected aberrations in industry conditions. Profits of the industry generally represent conditions within the industry. If there is an unexpected change in these conditions there should be an association with earnings forecast errors of the firm.

The firm variables chosen for the research not only represent aberrations in the earnings stream of the individual firm, i.e., P_6 and P_{10} , but also characteristics of the firm. One characteristic is variability of past earnings. It is generally believed that a firm with a variable earnings pattern will find it more difficult to make accurate forecasts than a firm with a smooth earnings pattern. If this

is indeed the case there should be an association between the coefficient of variation of past earnings and earnings forecast errors.

The other firm characteristic included in the research is the size of the firm. It is generally believed that a large firm should be better established and have a more sophisticated management, and therefore, should be able to make more accurate forecasts than a smaller firm. If this is indeed the case there should be an inverse association between the size variables and earnings forecast errors. Two size variables are included in the research for the reason that both are frequently mentioned when forecast errors are discussed.

Since this research is inductive in nature, the choice of variables considered is primarily, although not entirely, at the discretion of the researcher. To the extent meaningful variables are not included, or incorrect measures are employed, valid criticisms of this research certainly exist.

Computation of Relative Forecast Errors

The objective of this research is to analyze earnings forecast errors. The measurement of forecast errors is simply the difference between actual earnings and forecasted earnings for the year. However, this simple measurement will be of a different scale for each firm. To remove the scale differences the forecast errors are computed relative to the forecasted earnings. This results in the following measurement:

$$\text{Relative Forecast Errors} = \frac{\text{Actual E.P.S.} - \text{Forecasted E.P.S.}}{\text{Forecasted E.P.S.}}$$

Forecast errors, then are measured as a percentage of forecasted earnings.

Source of Forecasts

The earnings forecasts that are necessary to compute the Relative Forecast Errors are found in the Wall Street Journal.¹ For the most part, the forecasts are given by company executives at about the time of the annual stockholders' meetings. This research methodology is designed to examine the forecasts as if they could be included in annual reports. For this reason, and for computational purposes, several restrictions are placed on the forecasts before they are included in the subpopulation.

The first restriction is that the forecasts have to appear no more than 120 days into the fiscal year to which the forecast pertains. The Securities and Exchange Commission requires annual reports of firms whose securities are listed to be issued no later than 120 days after the end of the fiscal year [4]. By placing the 120 days restriction on the forecasts, it makes it chronologically possible for the annual report to contain the forecasts of the coming year's earnings. To reduce the data gathering effort only the January through April editions of the Wall Street Journal are examined. These editions will satisfy the 120 days restrictions for December 31 fiscal year firms and additionally forecasts for September 30 through December 30 fiscal year firms may be found and will be usable if they satisfy the 120 days restriction.

To be included in the subpopulation, the forecasts must also be worded so as to give the appearance that net income, and not earnings before extraordinary items is being forecasted. This restriction is necessary to meet the data requirement of the previously specified model.

¹For a complete description of the earnings forecasts included in this study see [3].

An additional restriction placed on the forecasts to be contained in the subpopulation is that the forecasts be point estimates. Forecasts in the form of ranges or in the form of "at least" or "no more than" are excluded because their use would require assumptions to be made about the probability distributions of the ranges of the former, and forecast error measurement problems with the latter.

As pointed out in the description of the model, the computation of Relative Forecast Errors requires actual earnings to be compared with forecasted earnings. The actual earnings to be compared with the forecasted earnings attained by the procedures described above are to be found in Moody's Investor Service, Inc. manuals [5]. Since most forecasts are in the form of per share figures, the computation of forecast errors will use per share figures. The necessary adjustments for stock dividends and stock splits were made. Once the forecast errors are computed, the computation of Relative Forecast Errors is completed by simply dividing by forecasted earnings. This procedure allows the forecast errors to be expressed as a percentage of forecasted earnings and also allows the forecast errors to be on a common basis.

The Study Period

The time period used for this study is the years 1966 through 1970. The selection of this time period is somewhat arbitrary, but this period of time did exhibit some differing economic conditions. These differing economic conditions are reflected by the First National City Bank of New York's survey of annual corporate profits [5]. For the years 1966, 1968, and 1969 corporate profits increased 10 percent, 9 percent, and 3 percent, respectively; while in 1967 and 1970 corporate profits decreased

by 1 percent and 7 percent, respectively. The advantage of having differing economic conditions during the study period is to make the study more general.

The data gathering effort resulted in 182 earnings forecasts that satisfied the above data requirements. While many more forecasts were found in the Wall Street Journal, they were in the form of range forecasts or open-end forecasts. In addition, several forecasts are excluded from this study because past earnings figures are not available.²

THE STATISTICAL ANALYSIS

In the previous section a model is posited that represents earnings forecast errors as a function of unexpected events that occur at the economy, industry and firm level. Ten variables are then specified that represent the unexpected events, as well as several other characteristics of the environment and the firm. To the extent that the proper variables are specified, they should be useful in discriminating between firms whose forecasts are of differing magnitudes of error. Multiple discriminant analysis (MDA) is designed to examine the discriminating ability of independent variables between groupings of the dependent variable. The statistical analysis performed consists of segregating the earnings forecast errors into four groups based on the magnitude of the forecast errors and then examining the discriminating ability of the ten variables by performing MDA.

²In the original descriptive study [3], 201 earnings forecasts were included. Of this initial 201 forecasts, 19 were excluded because of the absence of needed past earnings data.

As MDA is used in this research, MDA is the study of the nature of group differences. MDA seeks to define, on the basis of multiple measurements, a few dimensions on which several well-defined groups differ from each other. In this study, MDA is used to define the dimensions on which the groups of Relative Forecast Errors differ from each other on the basis of the variables previously discussed. The technique involves finding the linear combinations of the variables which maximize the ratio of between-groups variance to within-groups variance [6, pp. 157-170].

Before the MDA can be performed, however, there are at least two problems to be dealt with. First, it is obvious that some of the variables previously discussed are highly correlated with one another. MDA assumes a dependent variable, forecast errors in this case, and a number of independent variables that are uncorrelated with each other [6, pp. 157-160]. Secondly, the use of ten independent variables provides a highly complex structure. It may be possible to simplify the structure by reducing the number of independent variables without serious loss of information. The seriousness of both of these problems may be reduced by performing a principal components analysis on the data matrix of the independent variables. This phase of the statistical analysis is discussed below.

The Principal Components Analysis Phase

Before the first step of the analysis, the data was standardized. This procedure eliminates the disparate measurement units of the ten independent variables. The use of standard scores also greatly enhances the interpretability of the results of the multiple discriminant analysis.

With the standard scores the principal components analysis was performed. The results of the analysis can be seen in Table 1.

Table 1

Summary of Principal Components Analysis for
the Ten Independent Variables

Factor	Eigenvalue	Percent Variance Explained	Cumulative Percentage of Variance Explained
1	2.65	26.55	26.55
2	1.85	18.54	45.09
3	1.32	13.29	58.38
*4	.98	9.84	68.22

* The remaining factors were omitted from further analysis due to their small contribution of explained variance.

The principal components analysis reduced the ten independent variables to four underlying factors that are mutually uncorrelated. In interpreting the results of principal components analysis, of interest are the number of distinct factors, how the original data is grouped in the distinct factors, and finally if the factors can be given a meaningful interpretation in terms of the research questions. The answers to these questions are found by examining the grouping of the original variables with the factors presented in the factor loadings matrix found in Table 2.

To obtain meaningful interpretations from the factors, the ideal situation is to have high factor loadings for a few of the variables and very low loadings for the remainder of the variables for each factor. Upon examination of Table 2, it is obvious that this ideal situation does not exist after the principal components analysis. To bring the interpretation of factors into sharper focus, several "factor rotation" have been developed. In this analysis a varimax rotation was performed to obtain factors that can be more clearly interpreted [6, pp. 157-170].

Table 2

Summary of Factor Loadings Matrix
from Principal Components Analysis

Variable	FACTOR			
	1	2	3	4
1	.776	.405	.217	.142
2	.819	.425	.142	.115
3	-.523	-.320	.409	.306
4	-.454	-.208	.524	.359
5	.301	.257	.255	.563
6	.051	.160	.572	-.552
7	-.534	.748	.066	-.090
8	-.511	.630	-.092	-.026
9	-.513	.561	-.070	.153
10	.021	-.027	.641	-.271

The objective of varimax rotation is to rotate the original factors such that maximum factor loadings are obtained, but maintain the orthogonality of the factors. This results in a set of mutually uncorrelated factors for which the factor loadings are high for a few of the original variables and low for the remainder of the original variables. The results of the varimax rotation are presented in Table 3.

Interpretation of the factors

Examination of the factor loading scores for factor 1 in Table 3 discloses that variables P_7 , P_8 , and P_9 are used in giving a meaningful interpretation to factor 1. These three variables are the variability in past earnings, the size of the firm as measured by total assets and the size of the firm as measured by total revenue. Based on the high factor loadings of these three variables, factor 1 is interpreted as representing the size of the firm and the stability of the firm operating results. It is obvious that factor 1 is an individual firm level variable in the MDA.

Table 3

Summary of Factor Loadings Matrix
from Varimax Rotation

Variable	FACTOR			
	1	2	3	4
1	-.117	.825*	-.333	.169
2	-.122	.822*	-.420	.135
3	.020	-.181	.775*	.043
4	.068	-.021	.797*	.112
5	.037	.690*	.215	-.121
6	.063	-.000	-.063	.807*
7	.913*	-.030	.012	.152
8	.812*	-.086	-.014	-.020
9	.759*	-.016	.121	-.126
10	-.071	.068	.209	.657*

* These variables are the variables used in interpreting the factors. The choice of where to place the cutoff is somewhat arbitrary. Of primary importance is the presence of meaningful interpretation. The cutoff for factor loading scores is .65.

Factor 2 is interpreted based on the high factor loading scores of variables P_1 , P_2 , and P_5 . These variables are the change in the rate of growth of Gross National Product, the change in the rate of profit growth for all firms, and the rate of change in industry profits. Factor 2 is interpreted as representing conditions exogenous to the firm, and more specifically the rate of change in GNP and profits of all firms.

The interpretation of factor 3 is derived from variables P_3 and P_4 . The variables are the rate of inflation and the change in the federal corporate income tax rate. Like factor 2, factor 3 also represents conditions exogenous to the firm, namely inflation and changes in income tax rates.

Finally, factor 4 is interpreted by examination of variables P_6 and P_{10} . The variables are the change in the firm's income from operations and the relative amount of reported extraordinary gains and losses. Like factor 1, factor 4 represents an individual firm factor, and more specifically the earnings stream of the firm. This factor includes both changes in earnings from normal operations and the results of nonrecurring events.

The varimax rotation resulted in four factors that are subject to meaningful interpretation. Two of the factors, factor 2 and factor 3, represent conditions exogenous to the firm making an earnings forecast. Factors 1 and 4 represent conditions unique to the firm making the earnings forecast. The next step in the analysis is to employ the four factors in the MDA phase of the research.

The Multiple Discriminant Analysis Phase

In that MDA assumes mutually exhaustive and exclusive groups, the forecasts are next placed into Relative Forecast Error groups. In this research the segmentation is based on the magnitude of the forecast errors and are as follows: errors ranging from 0 to 5 percent, 5 percent to 10 percent, 10 percent to 20 percent, and finally errors greater than 20 percent. These groupings are the result of an arbitrary, but necessary, decision, and do not appear to be without meaning. The distribution of the 182 earnings forecasts into the four groups is displayed in Table 4.

Table 4

Distribution of Forecast Errors into Groups

Group	Range	Number
1	0 to 5%	65
2	5% to 10%	27
3	10% to 20%	37
4	20% to ∞	53
Total		182

The next step in the analysis is to employ MDA to examine the ability of the four factors resulting from the varimax rotation to discriminate between the four groups of earnings forecasts errors. Because standardized scores are used, the coefficients in the discriminant functions are subject to direct interpretation, i.e. the larger the coefficient the more important is that factor in discriminating between the four groups. The results of the MDA are displayed in Table 5.

Table 5

MDA: Discriminant Function Coefficient

Factor	Discriminant Coefficient	Rank
1 Size of firm, variability of earnings	.103	4
2 Change in GNP, profits of all firms	-.651	2
3 Inflation, change in tax rate	-.243	3
4 Change in firm's profits	-.712	1

Table 5 displays the discriminant coefficients for only one discriminant function since only the first discriminant function is significant. MDA has as its objective the maximization of the ratio of

between group sum-of-squares to within group sum-of-squares [6, pp. 111-125]. The algorithm first chooses the function that explains the largest between group variance, and then proceeds to another function based on the residual variance after removing the first discriminant function. The algorithm results in $(K-1)$ discriminant functions, where K is the number of groups.³ In this study there are four groups, therefore three discriminant functions are obtained, but only the first function is significant. In fact, the first discriminant function, displayed in Table 5, explains 88.5 percent of the between group variance. Using Rao's F-ratio approximation or Bartlett's V statistic for testing overall significance [6, pp. 164-170], the null hypothesis of no difference can be rejected at the 0.1 level.

In examining the coefficients of the discriminant function, factors 2 and 4 are somewhat stronger than the other two. Factor 4 is the strongest, and represents the change in profits of the individual firms making the earnings forecasts. Recall that this factor includes both the rate of change in income from normal operations and the relative amount of income from nonrecurring events.

Factor 2 represents the rate of change in GNP, along with the rate of change in profits of all firms and the rate of change in profits of the firms in the same industry as the firms making the earnings forecasts. Recall that the variables represented by factors 2 and 4 are in fact deviations from the trends of earnings streams and deviations from the growth trend of GNP.

³The number of discriminant functions is limited by the number of groups (minus one) only when the number of groups exceeds the number of variables. If the number of variables is less than the number of groups, then the number of discriminant functions will equal the number of variables.

The discriminant dimension may be illustrated by plotting the vector of discriminant scores. The discriminant score for each group is obtained by multiplying the discriminant coefficients from Table 5 by group means on each of the four factors. The vector of discriminant scores is presented in Table 6.

Table 6

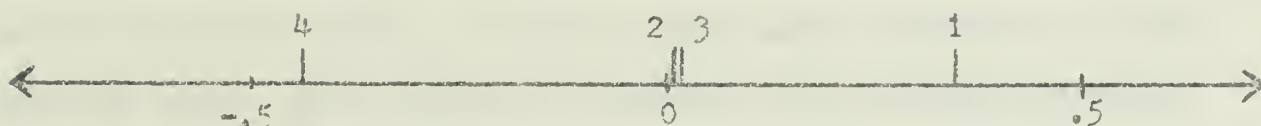
Discriminant Scores for Groups

Group	Number of Observations	Percent of Observations	Score
1 0 to 5% error	65	35.7	.3239
2 5% to 10% error	27	14.9	.0032
3 10% to 20% error	37	20.3	.0449
4 20% to ∞ error	53	29.1	-.4304
	182	100.0	

The information in Table 6 is demonstrated by the graph in Figure 1. Since only one of the discriminant functions is significant, the forecast errors can be considered as discriminated along a single line, i.e., one dimensional space. Figure 1 simply plots the discriminant scores from Table 6 along a line.

Figure 1

Single Dimension Discrimination of Earnings Forecast Errors by Groups



In Figure 1 the positive end of the axis represents the following characteristics: small deviations in the earnings trend of the individual firm; small deviations in growth rate of GNP, earnings trend of all firms and earnings trend of industry firms; small changes in tax rate and in inflation; and small firms and low variability in past earnings. The negative end of the axis represents just the opposite of the positive end, e.g., large deviations in the earnings trend of the individual firm, etc.

Figure 1 points out the fact that the discriminant function is strong in discriminating between small errors, 0 to 5 percent, and large errors, greater than 20 percent. But the discriminant function is weak in discriminating amongst medium range errors, 5 percent to 20 percent. In fact, groups 2 and 3 are out of sequence in Figure 1.

Conclusions

This research effort attempts to identify factors that are associated with the accuracy of earnings forecasts. A discriminant function was derived that explained 88.5 percent of the between group variance for the four groups of earnings forecast errors used to formulate the function. Based on the fact that factors 2 and 4 are the dominant variables in the discriminant function, two possible conclusions may be made.

The first possible conclusion is that firms that had earnings forecasts included in this study, and that made large errors, are not able to forecast factors, in general, that cause aberrations in their earnings trend. This conclusion is based on the dominance of factor 2 and 4 in the discriminant function. Recall that factors 2 and 4 deal with deviations from recent earnings trends.

Recall that factor 2 represents deviations in the trend of GNP growth and in the profit trend of all firms, while factor 4 represents deviations in the trend of earnings from operations and the effect on earnings of nonrecurring events of the individual firms. Note that there is no industry level factor. The fact that factor 2 represents deviations in the earnings of all firms, as well as deviations in the earnings of firms in the same industry, suggests that economy wide deviations in earnings trends represents this phenomenon by itself. Furthermore, since these two variables combined in factor 2 with changes in the growth trend of GNP, the analysis suggests that those variables exogenous to the firm that are beneficial in discriminating between forecast errors can be represented by changes in the growth rate of GNP. These three variables are mutually correlated or they would not have been combined in factor 2.

The implication stemming from the strength of factor 2 in the MDA, is that in making forecasts or in assessing the accuracy of forecasts, due consideration must be given to possible conditions affecting the growth trend of GNP. Included in this due consideration would be such things as governmental fiscal and monetary policy and any other variables that affect GNP.

Factor 4 is the strongest of all the factors, although it is only slightly stronger than factor 2. The implications of this fact are that this endogenous factor is slightly more important than the exogenous factor 2. In making a forecast, or in assessing the accuracy of a forecast, the size of the firm and the variability of the firm's past earnings stream are not as important as events that cause the current

year's earnings to deviate from the recent trend of earnings. This implies that careful consideration should be given to such things as employee strikes, changes in product demand and new products, as well as events that historically have been reported as extraordinary gains and losses.

The second possible conclusion is that firms in this study with large forecast errors use what may be considered naive forecasting models. It is obvious from the dominance of factors 2 and 4 that such a naive model would be a linear extrapolation of the immediate past earnings trend. The use of such a model results in a forecast error to the extent of aberrations from the trend. This fact would explain the dominance of factors 2 and 4 in the discriminant function.

Limitations of the Study

The most obvious limitation of this study is that the method used to gather the earnings forecasts does not result in a random sample. Therefore, any statistical conclusions cannot go beyond the population of earnings forecasts in this study.

Another possible limitation involves the choice of variables examined. To the extent incorrect variables were chosen for inclusion in this study and/or to the extent these variables were incorrectly measured, the study is weakened.

Finally, MDA results in a weighted linear combination of variables in the discriminant function. To the extent that the "true" function is not linear, this study is weakened.

Future Research

As this research presently stands, it is incomplete. At least two additional steps are needed. Both of these steps involve validation

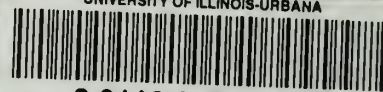
techniques. The first validation is a split-sample validation technique. This involves deriving a discriminant function from one-half of the forecasts and testing classificational ability on the other half of the forecasts. This technique examines the extent to which the discriminant function is bound by the sample observations.

The second validation technique is to examine the stability of the discriminant function over time. This step would involve the examination of the classificational ability of the discriminant function in post-1970 periods.

References

1. "SEC Plans 'Gradual Change' in Forecasting Policy," The Journal of Accountancy (March 1973), pp. 22-23.
2. Monthly Letter (First National City Bank of New York), April 1964-1971.
3. Charles L. McDonald, "An Empirical Examination of the Reliability of Published Predictions of Future Earnings," The Accounting Review (July, 1973), pp. 502-510.
4. New York Stock Exchange Guide, Volume III--Related Law and Regulations (Commerce Clearing House, Inc., 1962), p. 6183.
5. Moody's Bank and Finance Manual, Moody's Industrial Manual, Moody's Public Utility Manual and Moody's Transportation Manual (Moody's Investors Services, Inc.), volumes for the years 1967-1971.
6. Maurice M. Tatsucka, Multivariate Analysis: Techniques for Educational and Psychological Research (John Wiley and Sons, Inc., 1971), pp. 157-170.

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